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JEL Codes: Z1, I21, J16, J24, P30.
Keywords: Culture, Gender, Educational choice, STEM, Occupational choice, immigration, Soviet Union, Israel.

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From Pink-Collar to Lab Coat: Cultural Persistence and Diffusion of Socialist Gender Norms

Naomi Friedman-Sokuler* and Claudia Senik†

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Abstract

This paper documents the persistence and diffusion of Soviet gender-equal norms, exploiting the 1990's mass migration from the Former Soviet Union to Israel as a natural experiment. We track educational achievement and choices of an entire cohort, comparing gender gaps among Native students versus immigrants from FSU and other countries. We find evidence of vertical and horizontal diffusion of Soviet norms with respect to tertiary study field choice, especially those directly related to labor market occupations. In both traditionally male-dominated STEM fields and traditionally female "pink collar" jobs, such as education and social work, gender gaps are smallest among FSU immigrants. We show that these specific preferences are not explained by comparative advantages, as measured by early achievement. Finally, we show that among Natives the gender gap in field choice narrows with the presence of FSU immigrants, reflecting a shift in choice patterns of native women shift towards STEM and away from Pink collar study fields.

Keywords: culture, gender, educational choice, STEM, occupational choice, immigration, Soviet Union, Israel

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1 Introduction

Despite the "Great Gender Convergence" in Western-industrialized countries, women remain under-represented in high-paying jobs. One of the main reasons is occupational segregation, with male dominance in high-paying STEM occupations (science, technology, engineering and mathematics), and female predominance in the care sector, such as teaching and social work (Blau and Kahn, 2017; Cortes and Pan, 2018).[1] The persistence of segregation, despite the removal of formal barriers, has brought attention to two important factors: gender differences in preferences vis-à-vis occupations' subject matter, e.g. women's preference for "opportunities to work with people rather than things" (Fortin, 2008); and women selecting into occupations that allow for work-life compromises—shorter working hours and higher time-flexibility—where the presence of children plays an important part (Bertrand *et al.*, 2010; Goldin, 2014).[2] A growing body of literature shows that these two factors are, at least partly, driven by cultural gender norms and sustained by institutions that reflect these very norms: women choose investments in human capital in anticipation of their future social roles.(Fernández, 2007). However, different "cultural equilibria" may arise depending on local institutions and labor markets.

In this paper, we study the encounter of two different gender cultures, Western and Soviet, triggered by the large immigration wave from the FSU to Israel in the early 1990's. In the socialist bloc, for over 45 to 70 years, a specific culture was forged by the priority given to science and engineering within education and research, which paralleled that of the military-industrial sector within the economy. Both were instrumental in the economic competition and arms race with the Western capitalist world, in particular the United States (Graham, 1993). An important feature of the Soviet system was that its strong scientific culture was shared by both men and women. This contrasts with other countries, such as France and Israel, where STEM fields are also notorious,

[1] Women's under-representation in STEM occupation, particularly engineering and information technology is anticipated in secondary and tertiary education by their under-representation in mathematically intensive study fields, such as physics and computer science (Turner and Bowen, 1999; Riegle-Crumb *et al.*, 2012; Buser *et al.*, 2014; Friedman-Sokuler and Justman, 2016; Justman and Méndez, 2018; Rapoport and Thibout, 2018; Zafar, 2013)

[2] This has generated a range of public and private initiatives meant to attract "women to science". See for instance the L'Oreal program For Girls in Science at https://www.forwomeninscience.com

but almost exclusively masculine.[3] While in these environments, scientific studies and careers are considered prestigious and desirable for men, in the former Soviet Union (henceforth FSU) and Socialist countries in general, these preferences also extended to women (Buckley, 1981; Lippmann and Senik, 2018). At the same time, Socialist countries also developed institutions aimed at promoting full employment (and fertility) of both men and women, harnessed to the objective of rapid industrial growth. Since 1970 onward, women constantly made up half of the Soviet labor force (51%), and about 60% of skilled workers with an average or higher level of education (Goskomstat USSR, 1989, 1990). Even physically difficult occupations had a significant share of female workers—e.g. 25% in the construction sector (Goskomstat USSR, 1989). This involvement in the labor market and science influenced the work values of women, and, more generally, modified the conception of gender roles and identity as compared to those common in the West (Buckley, 1981; Wolchik, 1981, 2019; Haan, 2012).

This socialist culture did not vanish with the fall of the Berlin wall. On the contrary, its persistence in terms of female labor market participation, school performance, and family arrangements, has been documented in several studies, particularly with respect to the episode of division and reunification of Germany (Cooke, 2007; Bauernschuster and Rainer, 2012; Görges and Beblo, 2015; Campa and Serafinelli, 2018; Lippmann and Senik, 2018; Lippmann *et al.*, 2020).[4] Recent Eurostat data show that the percentage of women in science and technology is still systematically higher in former socialist countries than in the rest of Europe.[5] Evidence from international standardized PISA scores, International Mathematical Olympiads, and international chess competitions show that the gender gap in math and math-minded competitions is generally

[3]For instance, out of the 59 mathematician laureates of the Fields medal, 11 were French (12 American, 7 British, and 9 Russian or Soviet) and 15 were affiliated to a French institution at the time of the award: https://stats.areppim.com/listes/list_fieldsxmedal.htm

[4]Cultural economics has established that the beliefs, preferences and attitudes of a group could persist over time and be transmitted across generations, even after the grounds on which they formed in the first place, such as institutions, regulations, or markets, have disappeared.The vertical durability of culturally inherited attitudes has been illustrated, inter alia, in the domain of violence (Grosjean, 2014), political attitudes (Alesina and Fuchs-Schündeln, 2007), time preference and trust (Algan and Cahuc, 2010; Alesina *et al.*, 2013), development (Ashraf and Galor, 2013; Spolaore and Wacziarg, 2013), and gender norms (Giuliano, 2007; Fernández and Fogli, 2009; Lippmann *et al.*, 2020).

[5]https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220513-1

smaller in countries of the former Soviet bloc, as opposed to other European countries (Lippmann and Senik, 2018) .

A glance at the behavior of women from the FSU in the Israeli labor market also reveals very specific patterns. The fall of the Iron Curtain in 1989 triggered an unprecedented migration of Jews from the FSU to Israel—within the span of 5 years, over 800,000 immigrants arrived in Israel. Among women in prime working age in 2016, FSU immigrants have the highest rate of labor force participation (93%), followed by natives (89%) and other immigrants (84%). Women from the FSU are also more likely to hold a full time job (40 hours per week) and to work long hours, compared to female natives and other immigrants respectively. They are also more likely to be in health, ICT and engineering occupations, whereas native women are more likely to be in teaching, social, and law occupations.[6] All these observations suggest that in Israel, women from the FSU are not conforming to the local Western gender norms.

Admittedly, while these patterns are indicative of cultural persistence, they could also reflect the direct experience that these women had with Soviet institutions, prior to immigration, such as schools and (expected) labor market opportunities. To avoid this confounding effect, we focus on a cohort of students born in 1988/9, before the fall of the Berlin wall, of which nearly 15% were born in the FSU and 4% were born in other countries.[7] For the FSU immigrants this implies that, on the one hand, the timing of their birth is not related to the immigration choice and, on the other hand, they arrived in Israel as infants or young children, before substantial exposure to FSU institutions. We treat the immigration wave as a natural experiment with respect to selection into immigration because both the choice to migrate and the timing were largely driven by global geo-political events. Overall, 75% of the USSR Jewish population migrated following the fall of the Iron Curtain, indicating that selection into immigration was based on ethnicity rather that human capital or other economically relevant characteristics, and the default immigration destination for FSU

[6] Authors' calculations based on the 2016 Labor Force Survey of the Central Bureau for Statistic, Israel. Sample: women born in 1972-1991.

[7] Appendix, Table A1 shows that among immigrants from former communist countries, only 1.4% were born in socialist Central European countries outside of the Soviet Union. For brevity, we hereafter refer to the whole group as FSU immigrants.

Jews was Israel, which absorbed 75% of them.[8] Finally, the addition of nearly 20% to the country's population, brought with it substantial variations in the concentration of FSU immigrants across municipalities and schools in Israel, which we leverage to gauge the exposure of native women to Soviet-style gender norms.

We show evidence of both vertical persistence and horizontal diffusion of Soviet gender culture in educational and occupational choices, in particular with respect to the choice of occupations that are, in the West, traditionally either masculine (STEM) or feminine (education, nursing and social work). We use rich longitudinal administrative data to follow a synthetic cohort of Israeli students born in 1988 and 1989, from middle school achievement through tertiary education where early occupational choices are made. Within this cohort, immigrants, while born abroad, arrived in Israel as children, and as such face the same future labor market and are exposed to the same institutional setting as natives and other immigrants throughout the educational pipeline.

We track students' educational trajectories from achievement in eighth grade through tertiary education where, in Israel, the choice of study field reflects occupational choices. We distinguish three groups of population: natives—enacting Western gender norms; FSU immigrants—reflecting Soviet gender norms; and Other immigrants—representing a diversity of cultural backgrounds, but capturing the general effect of immigration on educational achievement and attainment. Using difference-in-difference estimates, we compare the magnitude of gender gaps and occupational segregation across these groups. In essence, this amounts to using male students as the baseline to account for unobserved characteristics of the three groups that drive choice patterns but are not gender specific. This difference-in-difference setup allows to separate the persistence of general preferences (of FSU students for STEM, by example) from gender norms regulating the choices made by women.

Our hypotheses are that: (1) Due to the persistence of socialist gender norms, gender segregation in education and occupations should be smaller among FSU descendants; (2) These

[8]The two other main destinations of FSU Jews were the United States and Germany. Cohen *et al.* (2011) compare Jewish immigrants across these three destinations and find indications that there was positive selection of migrants to the USA, and no discernible differences among migrants to either Israel or Germany.

smaller gender gaps are due to FSU women acting closer to traditional Western male choices rather than FSU men being closer to Native women; (3) Smaller gender gaps reflect cultural preferences over occupations, rather than initial differences in skills or abilities; (4) Increased exposure to the FSU gender equal culture affects the choice behavior of native females.

In terms of occupational choices, our results show that in tertiary education, where study fields serve as a gateway for many occupations, FSU women are over-represented in STEM, as well as in other fields, such as Economics, business and management, compared to women of the other groups. Moreover, they do not follow the general overwhelming female self-selection into study fields leading to "pink-collar" occupations, such as education and social work. This divergence leads to significantly narrower gender gaps in the choice of STEM, as well as traditional female study fields, compared with both natives and other immigrants. We interpret these differences as reflecting the persistence of preferences, as we show that they are not explained by differences in early STEM related skills or comparative advantage. Hence, the degree of gender-based field segregation within each group cannot be attributed to gender differences in skills. As concerns the third group of Other immigrants, its gender patterns are similar to those of natives, which indicates that the smaller gender gaps among FSU immigrants are not driven by the general effect of immigration as such.

Finally, we find evidence of horizontal diffusion of socialist gender norms to native women. As a proxy measure for the exposure of native students to Soviet gender norms, we use the concentration of FSU immigrants in middle school (eighth grade). This concentration should capture both school level peer effects as well as neighborhood effects, two vectors of local diffusion of cultural norms. We estimate the differential effect of this concentration on native men and women, conditional on school and municipality characteristics. It turns out that the propensity of native-born young women to choose tertiary STEM study fields increases with the concentration of FSU immigrants in their lower-secondary school, while young native men remain unaffected. Symmetrically, native women's propensity to choose Pink-collar study fields decreases as their exposure to FSU immigrants increases.

The paper proceeds as follows: section 2 presents related literature; section 3 describes the empirical strategy and section 4 the data we use; section 5 presents the results and section 6 concludes.

2 Related Literature

Our findings contribute to three current lines of research. First, they shed light on gender segregation in education and paid-work, especially concerning women with higher education. Recent literature has focused on gender differences in preferences vis-à-vis the content matter of occupations and job characteristics[9] (Cortes and Pan (2018)). Our paper highlights the fact that "female" preferences are culturally conditioned, as suggested by Akerlof and Kranton (2000). Moreover, the relationship between the concentration of FSU immigrants and the choice patterns of native women indicates that these preferences, while persistent, are not fully fixed, but can be influenced by the social context.

We also contribute to cultural economics, by providing empirical evidence of both vertical and horizontal diffusion of norms, such as proposed by Bisin and Verdier (2011), and illustrated by epidemiological studies, which analyze individuals from different cultural backgrounds functioning within the same institutional setting (Fernández and Fogli, 2009; Fernández, 2011; Nollenberger *et al.*, 2016; Charles *et al.*, 2018). Our findings agree with the recent stream of research that identifies the persistence of social norms inculcated during the Socialist era in Eastern Europe, years after the institutions that enforced these norms have withered. We expand this literature by showing evidence not only of the persistence of such norms among descendants of those who experienced these regimes, but also of diffusion among other groups with whom they come in contact. Close to our work, a recent article by Jarotschkin and Zhuravskaya (2019) illustrates how the initial gender norms of Germans and Chechens, who were deported from the Western parts of the USSR to Central Asia and Siberia, have been durably modified by the exposure

[9] Several studies point to marriage market concerns and family responsibilities (Chiappori *et al.*, 2018; Kleven *et al.*, 2019)

to that of local populations. Another paper by Schmitz and Weinhardt (2019) documents how the migration of East Germans to Western regions after 1989 has modified the behavior of West German couples, in particular with regards to the labor market participation of women. More recently, (Boelmann *et al.*, 2020) examined the persistence and spillovers of paid-work attachment of East German mothers following child birth. The analysis presented here is the first to examine the persistence of gender norms with respect to educational and occupational choices.

Finally, our findings relate to a growing literature on the impact of immigration on educational outcomes of natives (Ballatore *et al.*, 2018; Bossavie, 2020; Figlio *et al.*, 2021). We extend this literature that focuses largely on the effect of immigrants on natives' achievement to the effect on preferences. Our work complements that of Gould *et al.* (2009) who illustrate how the concentration of immigrants in primary school negatively affects the retention and matriculation rates of native Israeli children, especially those from lower socio-economic background. While our results confirm these findings, we also reveal an additional channel through which immigrants affect educational outcome of natives—cultural diffusion. Early exposure to a culturally distinct group, here FSU immigrants, leads to the relaxation of traditional gender norms regarding educational and occupational choices.[10]

3 Estimation strategy

Tertiary study field choice is our main outcome of interest reflecting, in Israel, ex-ante occupational choice. Tertiary programs in Israel are field specific, rather than general, and a large share of bachelor degrees, such as nursing, engineering, and teaching are directed at occupational accreditation or preparation, in addition to the academic Bachelor degree (Central Bureau of Statistics, 2009). Moreover, the relationship between occupational choice and field of study is

[10]The timing of exposure may play a crucial role in cultural diffusion, as Orrenius and Zavodny (2015) and Anelli *et al.* (2017) identify a crowding-out effect of foreign students on US natives in STEM majors.

strong because Israeli students enter tertiary education at an older age, around age 24, and therefore more oriented towards the labor market.[11]

3.1 Vertical transmission estimation

To estimate the extent of vertical transmission we use a difference-in-difference framework comparing gender gaps across three groups within a single labor market and education system. The three groups are "FSU immigrants", "Native born Israelis", and "Other immigrants". Equation 1 describes our basic framework, where y is a binary variable indicating whether individual i attended a tertiary program within study field; $Female$ is a gender dummy, and FSU, $Native$, and $Other$ are origin-group fixed-effects. By this construction FSU males serve as the reference group. Thus, coefficient β_1 reflects the gender difference in outcomes within the FSU group, while β_2 and β_3 capture the general differences of natives and Other immigrants with respect to FSU immigrants. For example, persistence of the Soviet scientific culture should lead to negative estimates for β_2 and β_3, when the outcome is the choice of STEM study fields.

$$y_i = \alpha + \beta_1 Female + \beta_2 Native + \beta_3 Other + \beta_4 Fem * Nat + \beta_5 Fem * Other \tag{1}$$

As discussed above, the difference in gender gaps between FSU immigrants and natives at the center of our analysis is reflected in coefficient β_4. However, immigrants generally differ from natives by poorer language skills (here in Hebrew), as well as potential depreciation of human and social capital of parents, which may affect the choices made by their children. Therefore, the group of "Other immigrants", i.e. individuals who immigrated as children from non-FSU countries, play the role of a second control group. To the extent that differences in gender gaps between FSU immigrants and native, β_4, is merely driven by the effects of immigration and not cultural norms, one would expect β_5 to be close to zero, i.e. gender gaps among immigrants are independent of

[11] According to the ICBS, the median age of degree completion was 27.5 in the relevant years, implying that study field choices occur at age 23-24. This is only partially explained by the mandatory army service which starts at age 18 and lasts two years for women and three for men.

cultural origin. If it is not, it will signal a specific behavior of FSU women, as opposed to both native and other immigrant women. In section 4 we discuss in more detail the composition of the Other immigrants group. Following hypothesis (1), we expect β_4 and β_5 have the same sign as β_1, meaning that gender gaps in tertiary educational choices are smaller within the FSU group, especially in sectors that in the West are traditionally very segregated, such as STEM or Pink collar. The structure of the estimation equation, where FSU men are the reference category implies that if the gender gap is narrowed among FSU immigrant, this is driven by the behavior of FSU women rather than by a difference in the choice made by FSU versus native men (hypothesis (2)).

Equation 2 is our full estimation specification. We include a variety of socio-economic (SES) variables at the individual, school and municipality levels that are related to educational opportunities: vector X_i for family income and parental education; a vector of average (excluding-self) socio-economic status (SES) among eighth grade peers $S8_{s-i}$; and a fixed effect for the municipality of residence η_m.

$$\begin{aligned} y_i = \beta_0 + \beta_1 Female + \beta_2 Native + \beta_3 Other + \beta_4 Fem * Nat + \beta_5 Fem * Other + \\ + X_i'\gamma + S8_{s-i}'\delta + \eta_m + Math8'\theta + u_i \end{aligned} \tag{2}$$

Finally, we include the vector $Math8$ that contains eighth grade mathematics achievement and the ratio of mathematics score to language score, that predate any track choice or specialization. Parents can transmit their preferences directly (explicitly or through role modeling) but also indirectly via investing in their children's skills. For example, they may train their children in mathematics or science from an early age, generating a comparative advantage in these fields. To test for direct transmission of preferences (hypothesis 3), we need to account for individuals' skills prior to choice. These measures serve as an anchor that allows to isolate the direct transmission of preferences, net of skills. As discussed by Angrist and Pischke (2009, p.68), the importance of skills in determining labor market outcomes is such that even when proxies for skills are themselves outcomes (a type of bad controls), including them in estimates is preferable to not doing so. It will

result in a downward bias in our estimates of the overall role of cultural norms in determining occupational choice.

3.2 Horizontal diffusion estimation

Horizontal diffusion could take place through the exposure of native students to FSU immigrants and their distinct gender norms (hypothesis 4). Such diffusion may operate through peer or neighborhood effects, insofar as they are *driven* by the local concentration of FSU immigrants. For example, early exposure of natives to a high share of female science-minded FSU schoolmates might reduce the "stereotype threat" associated with STEM. At the neighborhood level, the local concentration of FSU immigrant women (mothers) who exhibit strong attachment to paid-work and/or have STEM careers, may serve as alternative role models for young native women. A second type of neighborhood effect may appear if a high concentration of FSU immigrants in a locality generates a demand for STEM related extra-curricular activities or exerts pressure on local schools to improve the level of STEM teaching, both of which may benefit native students.[12]

We exploit the variation in the density of FSU immigrants across schools as an indicator of exposure to FSU cultural norms. This measure can be viewed as exogenous to students' preferences because in Israel, families generally do not choose primary and middle schools, but are allocated to them according to catchment areas defined by neighborhood of residence.[13] Hence, our estimation captures the combined effect of neighbors and schoolmates, the two potential channels of local diffusion. The challenge for identification stems from the fact that while there is no school choice, school level FSU concentration is driven by immigrants' residential choices related to local educational and labor market characteristics and possible responses by native families (Figlio *et al.*, 2021). Therefore, we focus on the relationship between FSU concentration and native gender gaps, assuming that, conditional on observables: individual, school and municipality levels

[12] While schools, especially in elementary and middle schools have little control over curriculum, they can make marginal shifts - especially through the choice of supplementary programs, supplied by the private sector.

[13] There was no school choice in Israel prior to high school in the years we are considering.

characteristics, residential choices of native and FSU families are orthogonal to *gender norms* at the school level.

We estimate Equation 3 on the sub-sample of native students, where $\%FSU8$ is the share of FSU immigrants in eighth grade, in a given school.[14] Our coefficient of interest is α_2, which measures the association between the concentration of FSU students in the school and the gender gap in natives' outcomes. Coefficient α_1 captures the relationship between the density of FSU immigrants and native students' outcomes, which may reflect selection. We include individual and school socio-economic status (SES) as before, adding to the vector of school characteristics, $S8_{s-i}$, the share of other immigrants in the school. Finally, we control for municipality of residence characteristics in the vector M_i, which proxies the local labor market characteristics, including: the share of FSU immigrants in 1983;[15] female labor force participation rate; average years of schooling for adults; and employment shares in the High-Tech sector.[16]

$$y_{is} = \alpha_0 + \alpha_1 \%FSU8 + \alpha_2 \%FSU8 * female + X_i'\gamma + S8_{s-i}'\delta + M_i'\eta_m + u_{is} \tag{3}$$

4 Data

We combine several administrative databases to follow two half cohorts of students enrolled in eighth grade in Israel in 2002 and 2003, throughout their secondary and tertiary education.[17] The study population is defined by our measure of individual eighth-grade achievement taken from Israel's Growth and Effectiveness Measures for Schools (GEMS, "meitzav" in Hebrew),

[14] We exclude from this estimation native students whose father was born in the FSU. We do not have information on mothers' country of birth.

[15] A well known determinant of immigrants' residential choices is the presence of compatriots from earlier waves of immigration. Moreover, this concentration may have in itself already affected the local labor market

[16] Shares of FSU immigrants are taken from the 1983 Census. Municipality labor market characteristics are taken from the 1995 Census. The share employed in the High-Tech sector is observed at the district (napa/mahoz) level (Central Bureau of Statistics, 2017)

[17] The following data bases were merged to create our data set by Israel's Central Bureau of Statistics using National Identity Numbers: the Population Registry; Ministry of Education's registry of students enrolled in 8th-grade in two consecutive school years, 2001/2 and 2002/3 (we refer to them in what follows as 2002 and 2003); the Ministry of Education's matriculation records of students enrolled in 12th grade in 2005/6 and 2006/7; Israeli Central Bureau for Statistic's registry of higher education; National Institute for Testing and Evaluation Psychometric database; and Tax Authority database.

a set of four standardized tests in literacy (Hebrew), mathematics, science and technology, and English. In 2002 and 2003 all schools in Israel with an eighth grade, except most ultra-orthodox schools, were split into two balanced samples of equal size, with half the schools participating in GEMS tests in 2002 and the other half in 2003. Our synthetic cohort is a composite of these two half-cohorts of eighth grade students, and is representative of the full population of schools.[18] We limit our analysis to students who have at least two of the four GEMS scores, and information on at least one of the parents' education.[19] The data set contains individual level data on: family socio-economic characteristics; municipality of residence; middle and high school characteristics; eighth and twelfth grade achievement; and tertiary study field. Immigrant students are identified according to their country of birth as recorded in the Population Registry.

The left panel of Table 1 displays descriptive statistics for our main sample, which contains 61,238 students, of which 18% are born outside of Israel, 14% born in the FSU and 4% from other countries. The top panel of Table 1 shows that within these cohorts, born in 1987-1989, most FSU immigrants arrived before age of seven, which is the school starting age in Israel, hence were exposed to the same institutional setting as natives and other immigrants throughout the educational pipeline.[20] As expected, native students come on average from higher income families, mostly in the top three quintiles. FSU immigrants belong predominantly in the middle section of the income distribution; and other immigrants are more often in the bottom two quintiles as well as the top quintile (see below). Concerning parental education, natives' level is centered around high school completion, 12 year of schooling. Among immigrants, both FSU and others, there is higher representation at the top and the bottom of the education distribution. 62% of FSU immigrant students have at least one parent with some post secondary education, compared to 49% of native students and 57% of other immigrants. Among FSU immigrants and natives,

[18] For a detailed discussion of the representativeness of the study sample and attrition patterns, see Friedman-Sokuler and Justman (2016)

[19] When we use the GEMS scores as explanatory variables we impute missing GEMS scores by regressing each GEMS score on the other scores and on all available background characteristics for students with all scores, and use the regression to predict missing scores.

[20] Table A4 in the Appendix shows our main estimation results limiting the sample to immigrants whose age of arrival is known and arrived by the age of 6. Since year of arrival is missing for 40% of Other immigrants, estimates for the under 6 population are in Table A4, are limited to Natives and FSU immigrants.

mothers have on average slightly more years of schooling than fathers and the opposite is true among other immigrants.

The right panel of Table 1 shows the characteristic of the two major immigrant groups that together comprise three quarters of the "other immigrants" group. First, immigrants from Ethiopia, whose timing of immigration was not chosen individually but rather by a state decision (Operation Solomon), similar to the FSU immigration wave. They arrived at approximately the same period as FSU immigrants and faced similar settlement conditions (temporary housing, etc.). However, their demographic characteristics are very different, especially in terms of parental education. Second, immigrants from Western and Northern Europe (EU) and North America (US). This group is composed of voluntary self-selected immigrants; their family characteristics are closer to FSU immigrants and natives in terms of parental education, especially tertiary education. To test the sensitivity of our results to the characterization of other immigrants, we estimate equation 1 on a modified sample where we only keep the latter in the "Other immigrants" control group (dropping all the other non-FSU immigrants).

4.1 Measures of skills and choice

The earliest available measure of skills is students' scores in the GEMS national tests in eighth grade (at age thirteen). These scores are measured prior to any sorting into study fields and have no direct impact on future sorting beyond their representation of student achievement, reflecting a combination of innate ability and parental investment. Inasmuch as initial investment in skills may differ across cultural groups, they will be reflected in eighth grade scores. The top panel of Table 2 shows average eighth grade scores in two testing subjects, mathematics and literacy (Hebrew) by origin. It shows that FSU pupils together with immigrants from the EU and North America exhibit the highest achievement in mathematics, while Natives have the highest achievement in literacy (Hebrew), followed by Other immigrants and FSU immigrants. Figure 1 shows the distribution of mathematics and language achievement by gender and origin group. With respect to mathematics, Native and FSU students exhibit similar distributions, but both FSU men and women dominate the

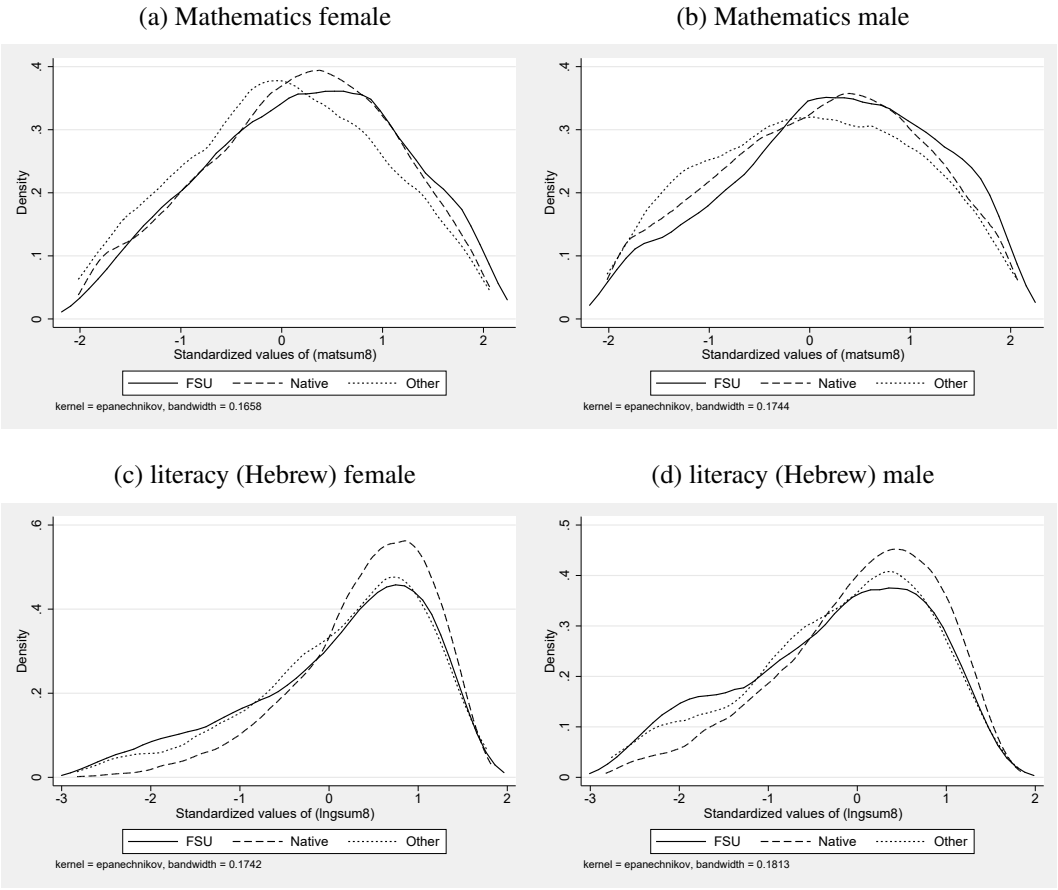
Table 1: Family SES measures and scores in eighth grade, by origin

	FSU immigrant	Native	Other immigrant	Ethiopia	EU & US
N	8,765	49,984	2,489	455	1,495
Share	0.14	0.82	0.04	0.01	0.02
Born 1987-89	0.99	1.00	0.98	0.95	0.99
Arrived by age 6	0.61	—	0.40	0.78	0.30
Unknown year of immigration	0.03	—	0.40	0.03	0.55
Family income quintiles					
Lowest	0.13	0.10	0.26	0.56	0.19
Second	0.28	0.15	0.21	0.29	0.19
Third	0.31	0.20	0.16	0.12	0.15
Fourth	0.21	0.26	0.14	0.03	0.17
Highest	0.07	0.30	0.23		0.30
Parents' maximal years of schooling					
<12	0.18	0.11	0.21	0.88	0.04
12	0.20	0.40	0.22	0.09	0.25
13-15	0.35	0.21	0.16		0.18
15<	0.27	0.28	0.41		0.52
Father's years of schooling	13.20	13.08	13.40	6.6	15.23
	(2.81)	(3.05)	(4.88)	(4.01)	(3.64)
Mother's years of schooling	13.42	13.18	13.05	6.26	14.67
	(2.67)	(2.76)	(4.43)	(3.56)	(3.04)
Religious school	0.06	0.21	0.33	0.53	0.30

$N = 61,238$. Study sample: all eighth grade students in Hebrew language schools who took at least two GEMS tests in either 2002 or 2003. Parents' maximal year of schooling is defined by the parent with the most years of schooling. Family income quintiles were calculated by the CBS over the entire population of students, including Arab and Ultra religious students. For continuous variables, standard errors are in parentheses.

top of the distribution. Other immigrants are the worst performers. As concerns literacy (Hebrew), irrespective of gender, native students outperform immigrants, and the distribution among the two types of immigrants is similar.

Figure 1: Distribution of eighth grade scores (standardized), by origin and subject



Notes: Distributions are presented for eighth grade students in Hebrew language schools who took each GEMS test in either 2002 or 2003. Scores are normalized to have a mean of 0 and standard deviation of 1, over the entire population of test takers. Density functions estimated using kernel-density of standardized GEMS scores.

Tertiary study field choice is our main outcome of interest, reflecting ex-ante occupational choice. We construct four major groups of tertiary study fields: STEM, "Pink collar", Economics and business, and Social sciences, and a fifth group "Other" that contains the programs that do not fit into either category.[21] The first two categories are closely related to labor market occupations. STEM is overall the largest study field, as shown in Table 2, and it comprises engineering degrees

[21] See the full allocation of programs to categories in Appendix Table A2

as well as traditional sciences. FSU immigrants are most likely to study STEM, 18 percent, followed by Natives, 16 percent, and then other immigrants, 14 percent, but immigrants from Western countries are more similar to FSU and Natives. Pink collar includes study fields that are directly related to traditionally female-dominated occupations, especially within the care sector: teaching, healthcare professions (nursing), and social work (Blau and Kahn, 2017). Table 2 shows that Natives and other immigrants are twice as likely to study pink collar occupations compared to FSU immigrants and the difference is largely driven by differences in the shares studying education.

The latter two categories do not directly map onto occupations. We define Economics and business programs as a category because these programs are associated with high earnings (Krill *et al.*, 2019). On the other hand, Social science is the largest category of programs, such as political or behavioral sciences, that exhibit not distinct relationship to either occupations or earnings. As illustrated in Table 2, Natives and immigrants, both FSU and other, are similar in their propensity to study Economics and business, while FSU immigrants are substantially less likely to study Social science. Overall, our constructed categories account for 76% of the FSU students in tertiary education and 82% of Native students. Within the other study fields, FSU immigrants are least likely to study Law and Arts, compared to the other groups.

Finally, Figure 2 shows the composition of the full set of tertiary outcomes, by gender and origin group, within each eighth grade mathematics achievement percentiles. As expected, in all groups, the share of STEM students increases with early mathematics achievement. Throughout the achievement distribution, FSU women are more likely to study STEM compared to women in the other groups; the same pattern holds among men. Above the 25th percentile, the share studying business and economics is relatively constant in all groups. The largest shares studying pink collar fields and social sciences is around the middle of the achievement distribution. Among women, at most achievement levels, FSU women are the least likely to enter tertiary education, but not at the expense of STEM or Economics and business, rather instead of Pink collar and Social science: they seem to prefer careers that are not based on tertiary education rather than tertiary degrees

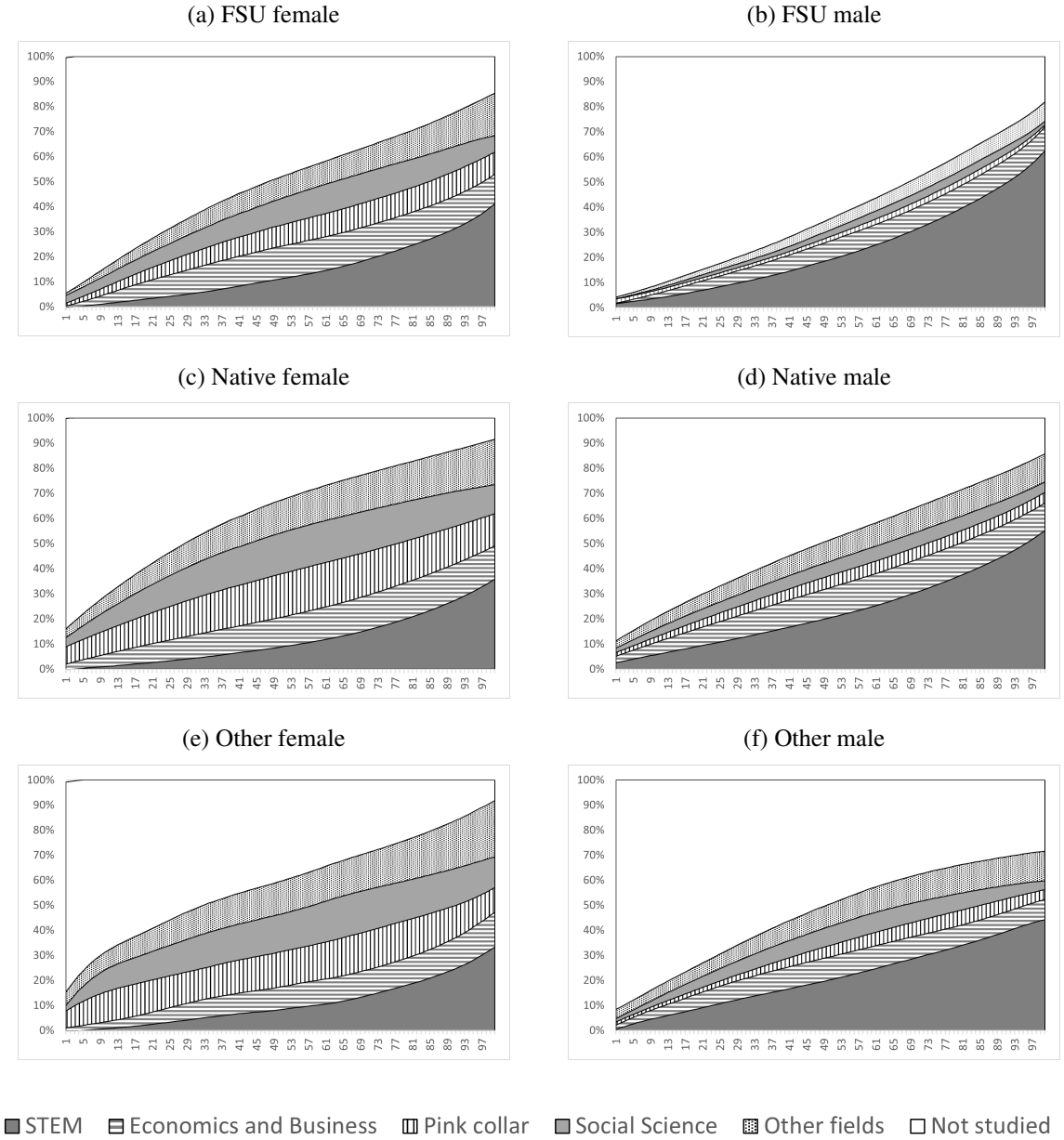
Table 2: Descriptive statistics of achievement and choice, by origin

	FSU immigrant	Native	Other immigrant	Ethiopia	EU & US
	Eight grade achievement				
Mathematics	54.99	52.82	49.72	33.47	55.86
	(24.11)	(23.85)	(24.35)	(21.33)	(23.19)
Hebrew	59.27	65.3	60.31	45.9	65.63
	(22.36)	(18.66)	(21.34)	(20.86)	(19.18)
	Tertiary education				
Studied in tertiary education	0.44	0.56	0.50	0.27	0.58
Grouped study field (as share of full sample)					
STEM	**0.18**	**0.16**	**0.14**	**0.04**	**0.17**
Engineering and architecture	0.11	0.10	0.07	0.03	0.09
Mathematics statistics and computer science	0.04	0.03	0.03		0.04
Biological sciences	0.02	0.02	0.02		0.03
Physical sciences	0.01	0.01	0.01		0.01
Pink collar	**0.05**	**0.10**	**0.09**	**0.06**	**0.10**
Education and teacher training	0.02	0.07	0.06	0.03	0.07
Health care professions	0.03	0.02	0.02		0.03
Social work	0.00	0.01	0.01		
Social science	**0.06**	**0.09**	**0.10**	**0.06**	**0.10**
Economics and Business	**0.09**	**0.10**	**0.08**	**0.06**	**0.08**
Business	0.06	0.07	0.05	0.05	0.05
Economics	0.03	0.03	0.03		
Other	**0.06**	**0.10**	**0.10**	**0.02**	**0.11**
Law	0.02	0.04	0.03		0.03
Humanities and regional studies	0.03	0.03	0.03	0.02	0.04
Arts	0.01	0.02	0.03		0.04
Medicine	0.00	0.01	0.00		
N	8,765	49,984	2,489	455	1,495
Share	0.14	0.82	0.04	0.01	0.02

$N = 61,238$. Study sample: all eighth grade students in Hebrew language schools who took at least two GEMS tests in either 2002 or 2003. Mean GEMS scores are calculated over students who took each test. For continuous variables, standard errors are in parentheses.

with relatively low returns (Krill *et al.*, 2019). This pattern is even stronger among FSU men who essentially only study STEM and Business and economics in tertiary education.

Figure 2: Tertiary field choices within percentiles of eighth grade mathematics achievement, by origin and gender



Notes: Tertiary academic programs grouped as described in Table A2. Share in each category is calculated by gender and origin group for each GEMS percentile, percentile are defined over the entire population.

5 Results

5.1 Field choice in Tertiary Education

Table 3 displays LPM estimates of Equation 1 for the four study fields categories, with the bottom panel showing coefficients from a separate regression where the Other immigrant group is limited to immigrants from Europe and North America.[22] Overall, FSU students are less likely to choose Pink collar fields or Social sciences, and are as likely as Other immigrants to study Economics and business. Irrespective of origin, women are more likely to study all fields except for STEM.

The results lend support to hypothesis (1), lesser gender segregation among FSU immigrants compared to natives—the male advantage in STEM is smaller as well as the female advantage in Pink collar and Social science. Strikingly, the gender gap in Pink collar study fields is nearly twice as large among Natives and Other immigrants than within the FSU group. Only in Economics and business is the gender gap favoring women larger among FSU than among natives and other immigrants (4.2 versus 0.8 and 0.5 percentage points respectively). Gender gaps are similar among FSU and Other immigrants only with respect to Social science. At the bottom panel of Table 3 we see that gender gaps in the group of Western immigrants are not distinct from the rest of the Other immigrant group.

The estimates in Table 3 also confirms hypothesis (2)—that differences in gender gaps are driven by the behavior of FSU women. The difference between native and FSU men in the propensity to choose STEM is 1.1 percentage points while the difference among women is more than twice as large 2.8 percentage points. The same holds for Pink collar programs, where the difference between FSU men and men in other groups is merely a third of the difference among women.

Are these smaller gender gaps among FSU students driven by a small number of outperforming girls? To enquire, we calculate the difference between the share of women and the share of men who choose each of the four study field categories by origin group, within each percentile of

[22] Estimates for the probability to study in tertiary education and in the "Other" category are shown in Appendix table A3

Table 3: Tertiary study field choices, by gender and origin group

	STEM	Economics and business	Pink collar	Social science
Female	-0.092***	0.042***	0.059***	0.066***
	(0.008)	(0.006)	(0.004)	(0.005)
Native	-0.011	0.034***	0.024***	0.024***
	(0.007)	(0.004)	(0.002)	(0.003)
Other immigrant	-0.036***	0.009	0.019***	0.037***
	(0.013)	(0.008)	(0.006)	(0.007)
Female X Native	-0.017**	-0.034***	0.052***	0.025***
	(0.009)	(0.007)	(0.005)	(0.006)
Female X Other	-0.014	-0.037***	0.044***	0.006
	(0.016)	(0.012)	(0.012)	(0.013)
Constant	0.220***	0.069***	0.012***	0.026***
	(0.007)	(0.004)	(0.002)	(0.003)
Observations	61,238	61,238	61,238	61,238
R-squared	0.022	0.002	0.038	0.025
EU & US immigrant	-0.001	0.017	0.048***	0.055***
	(0.024)	(0.016)	(0.014)	(0.015)
Female X EU & US	-0.033	-0.056***	0.079***	-0.004
	(0.029)	(0.021)	(0.026)	(0.024)

Omitted categories are male and FSU immigrants. Binary dependent variables vary by column and indicate the chosen category of tertiary education against all other options, including "No tertiary studies". Programs included in each category are detailed in Table A2. Coefficients are obtained from a LPM with cohort fixed-effects. Robust standard errors in parentheses.
* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

math performance in eighth grade. As shown by Figure 3, along the achievement distribution, we observe classic segregation patterns, with women over represented in Pink collar fields and Social sciences, and men in STEM. In Economics and business, for the most part there is no gender segregation among natives and other immigrants until the top quartile of mathematical achievement (to the advantage of women). At the same time FSU women are more likely to study Economics and business and their advantage actually narrows slightly in the top quartile. As concerns STEM, in all groups, the gender gap in STEM increases in mathematical achievement. But it is smaller among FSU immigrants, up to 90^{th} percentile [23] Apart from this small number of individuals, Figure 3 shows that the smaller gender gap in STEM choice within the FSU group characterizes the entire distribution of abilities.

Can the observed differences in choices be driven by individual or neighborhood socio-economic status? Estimates for our full specification, as described by Equation 2, are presented in Table 4 in columns (1).[24] Conditioning on SES has little effect on the overall gender gap in all choices, and leaves the differences in gender gaps across groups largely unchanged. However, it magnifies the differences between groups with respect to STEM programs, as FSU men are 2.2 and 4.5 percentage points more likely than natives and other immigrants to study STEM. In the other categories, SES differences account for up to half of the differences across groups. With respect to Pink collar programs, SES account for the entire difference between native men and FSU immigrant men and leaves Other immigrant males as the least likely to attend them.

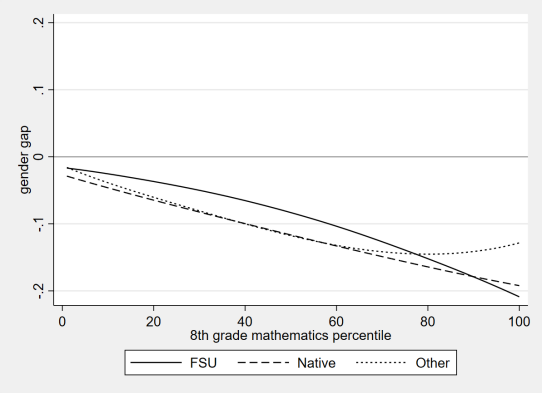
Finally, in columns (2), measures of early mathematics achievement and comparative advantage are added. As expected, eighth grade math achievement is positively related to all tertiary choices, and the coefficient is 3 to 10 times larger with respect to STEM than to any other study field. In a similar vein, comparative advantage in math, i.e. the ratio of mathematics to

[23] This is a classic observation. Breda *et al.* (2023), for instance, show that in the OECD, female top-achievers in math refrain from specializing in that field, which then creates an ex-post gender gap in measured ability on the self-selected sample of math students thus formed.

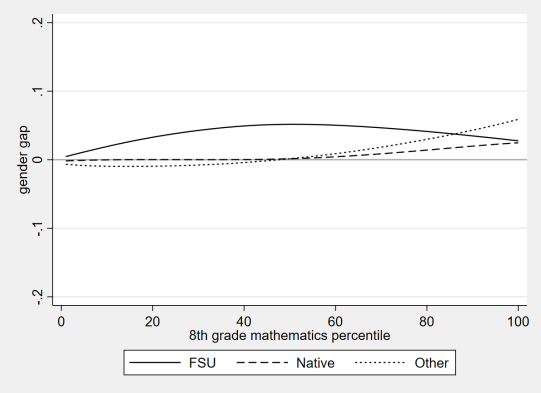
[24] The sample in this table is slightly reduced as it is limited to students whose eight grade cohort in school has at least 30 students, allowing us to construct school level measures of average parental education and family income quintile. These are constructed separately for each individual, leaving her our of the calculated average. Results from the full sample, replacing school characteristics by school fixed effect are similar and available upon request.

Figure 3: Gender gaps in tertiary study field choices, by origin group

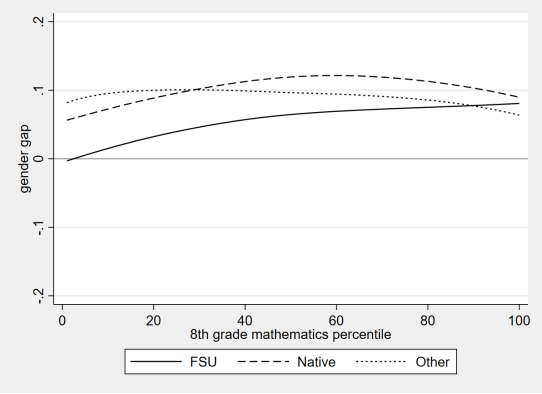
(a) STEM



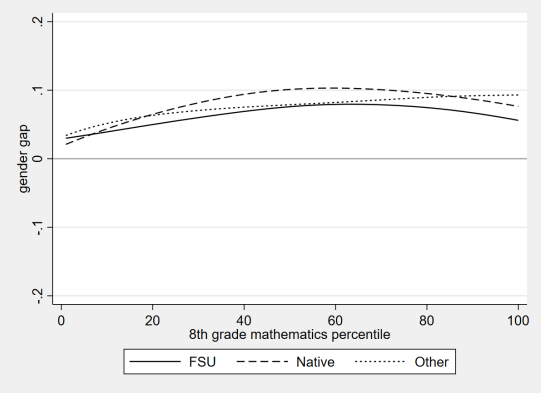
(b) Economics and business



(c) Pink collar



(d) Social science



Notes: Graphs represent the unconditional difference between the share of women and share of men choosing each of the four study field categories, by origin group, within eighth grade mathematics percentiles. Percentiles are calculated using all student in the sample who have a GEMS mathematics score. Lines are smoothed using Stata's Lowess procedure for kernel-weighted local polynomial smoothing

Table 4: Estimation of gender and origin gaps in tertiary study field choices

	STEM		Economics and business		Pink collar		Social science	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	-0.087***	-0.091***	0.044***	0.042***	0.060***	0.059***	0.068***	0.068***
	(0.011)	(0.010)	(0.006)	(0.006)	(0.004)	(0.004)	(0.006)	(0.007)
Native	-0.022**	-0.003	0.026***	0.031***	-0.001	0.001	0.012***	0.014***
	(0.009)	(0.008)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Other immigrant	-0.045***	-0.021	0.015*	0.022***	-0.017***	-0.015**	0.031***	0.033***
	(0.014)	(0.013)	(0.008)	(0.008)	(0.006)	(0.006)	(0.008)	(0.008)
Female X Native	-0.018	-0.024**	-0.034***	-0.035***	0.049***	0.049***	0.025***	0.024***
	(0.012)	(0.011)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
Female X Other	-0.013	-0.014	-0.038***	-0.038***	0.043***	0.043***	0.005	0.005
	(0.019)	(0.017)	(0.012)	(0.012)	(0.011)	(0.011)	(0.014)	(0.015)
Prior achievement								
Mathemetics		0.111***		0.031***		0.011***		0.010***
		(0.002)		(0.002)		(0.002)		(0.001)
Mathematic/Hebrew		0.049***		-0.028*		-0.037**		-0.028**
		(0.016)		(0.015)		(0.014)		(0.014)
Controls								
Individual SES	X	X	X	X	X	X	X	X
Middle school char.	X	X	X	X	X	X	X	X
Constant	0.177***	0.192***	0.076***	0.080***	0.005	0.007	0.025***	0.026***
	(0.011)	(0.012)	(0.008)	(0.008)	(0.006)	(0.006)	(0.005)	(0.005)
Observations	59,847	59,847	59,847	59,847	59,847	59,847	59,847	59,847
R-squared	0.058	0.127	0.006	0.014	0.058	0.059	0.031	0.032
Municipality FE	998	998	998	998	998	998	998	998
EU & US immigrant	-0.040	-0.032	0.021	0.023	-0.021	-0.020	0.047***	0.048***
	(0.027)	(0.024)	(0.014)	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)
Female X EU & US	-0.032	-0.019	-0.051**	-0.047**	0.071***	0.072***	-0.001	-0.000
	(0.031)	(0.030)	(0.021)	(0.020)	(0.027)	(0.027)	(0.024)	(0.024)

Omitted categories are male and FSU immigrants. Binary dependent variables vary by column and indicate the chosen category of tertiary education against all other options, including "No tertiary studies". Programs included in each category are detailed in Table A2. Coefficients are obtained from a LPM with cohort fixed-effects. Individual SES indicators include categorical variables for parents maximal years of education and family income quintiles. Omitted categories are parents with 12 years of schooling and third quintile of family income. Middle school characteristics include "leave-one-out" measures of average parental education and family income for others in students' eighth grade cohort in school as well as an indicator if a school is a state-religious school. Mathematics is a z-score of eighth grade GEM score and Mathematics/Hebrew is the ratio of eighth grade mathematics and literacy z-scores, windzorized at the 1^{st} and 99^{th} percentiles. Municipality fixed effect are for municipality of residence in twelfth grade. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

literacy (Hebrew) score, is positively related to STEM and negatively related to all other study fields. Conditioning on early mathematical achievement has no effect on the difference in gender gap for study field categories, except for STEM. The gender gap in the propensity to study STEM is larger among Natives compared to FSU immigrants by 26 percent (11.5 and 9.1 respectively) conditional on SES and prior achievement, while the difference between men is zero.

5.2 Gender gaps in achievements

Figure 3 and Table 4 showed that gender segregation is attenuated in the FSU group, even conditional on early math scores and comparative advantage. In Table 5 we ask to what extent narrower gender gaps are already observable in terms of mathematics and literacy achievement, as measured in eighth and twelfth grade. There is an important difference between eighth and twelfth grade scores: the former is measured prior to any track or specialization choice in the education system, while the latter already reflects some track choices in high school. This is especially true for mathematics, where students choose between three levels of difficulty, and scores are augmented with bonuses for difficulty level when applying to tertiary programs.[25] Therefore, eighth grade scores are our preferred measure of skills, representing a combination of innate abilities and parental investment. However, we also present results for twelfth grade scores as an indication of the evolution of gender differences in achievements that determines access to tertiary programs.

Table 5 shows the gender gap estimates for standardized mathematics and literacy achievement in eighth and twelfth grade, following Equation 2, without inclusion of the prior achievement

[25] To account for differences in the level of difficulty that students chose for their mathematics matriculation exams in a manner that will allows us to compare all students to each other, we construct a unified matriculation mathematics score that follows the weighting system used to determine university admissions in Israel: it adds a bonus of 25 points (out of 100) for 5 units of mathematics and 15 points for 4 units of mathematics. For students taking 1 unit of mathematics (not enough for full matriculation, and therefore not enough to gain admission to university) we deduct 50 points up to a score of 0; and we assign 0 points to students not taking any matriculation mathematics test. While these bonuses are essentially arbitrary the 4– and 5–unit bonuses do have real life meaning, as they are used by university administrators to determine access to higher education, in general, and to STEM degree programs in particular.

Table 5: Estimation of gender gaps in eight and twelfth grade achievement

	Mathematics		Literacy (Hebrew)	
	8^{th}	12^{th}	8^{th}	12^{th}
Female	0.022	0.127***	0.385***	0.277***
	(0.026)	(0.019)	(0.026)	(0.021)
FemaleXNative	0.049*	0.018	0.013	-0.031
	(0.029)	(0.019)	(0.028)	(0.020)
FemaleXOther	-0.008	-0.031	0.011	-0.053
	(0.051)	(0.039)	(0.046)	(0.038)
Constant	-0.077*	-0.048**	-0.478***	-0.207***
	(0.046)	(0.023)	(0.038)	(0.023)
Controls				
Individual SES	X	X	X	X
Middle school char.	X	X	X	X
Observations	52,763	59,858	54,928	59,858
R-squared	0.131	0.083	0.173	0.088
High school FE		879		879
FemaleXNA and EU	-0.185**	-0.146**	-0.084	-0.146**
	(0.088)	(0.064)	(0.085)	(0.064)

Omitted categories are male and FSU immigrants. Dependent variables vary by column and are z-scores of test scores in mathematics and literacy (Hebrew) in eight and twelfth grade. Twelfth grade scores are weighted according to selected matriculation difficulty level. Coefficients are obtained from an OLS regression with cohort fixed-effects and high school FE for twelfth grade scores. Individual SES indicators include categorical variables for parents maximal years of education and family income quintiles. Omitted categories are parents with 12 years of schooling and third quintile of family income. Middle school characteristics include "leave-one-out" measures of average parental education and family income for others in students' eighth grade cohort in school, as well as an indicator if a school is a state-religious school. Standard errors clustered at the school level in each grade in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

variables.[26] On average, women outperform men in both subjects and class levels, with a larger advantage in literacy compared to mathematics. In eighth grade, the female advantage in math is small and not statistically significant among FSU immigrants and both larger and significant among native students. For all other scores, the differences between groups in the gender gaps are not statistically significant and small in magnitude, ranging from 2.8 to 19 percent of the overall gender gap. Taken together, there is no evidence in Table 5 to indicate that later gender differences

[26] In this estimation, we use only actual and not imputed scores, so sample size varies between test subjects in GEMS, as tests were taken on different days. See Friedman-Sokuler and Justman (2016) for details.

in choices would be based on gender differences in skills across groups. In fact, the differences across groups, if any, are in favor of native girls. The only exception can be found in the bottom panel, where we see that young women who immigrated from Western countries have in fact lower mathematics achievement compared to boys from the same countries and their advantage in language is substantially smaller.

5.3 Horizontal diffusion of Soviet norms

Thus far, we established the persistence of Soviet gender norms among FSU immigrants, as reflected by lower gender segregation among FSU immigrants in terms of tertiary field choices. To test whether exposure to these norms affects the choice patterns of individuals from other cultural backgrounds, we estimate the relationship between the concentration of FSU immigrants in middle school and the gender gap in the choices of native students, as discussed in Section 3.[27] We remove from the sample of natives 1,961 native born students whose father was born in a formerly Communist country.[28] Figure 4 displays the distribution of native students by the share of FSU immigrants in their school's eighth grade level. The left panel shows that only 8% of students attend schools with no FSU immigrants in their cohort and the right panel shows that among those who have FSU immigrants in their cohort, exposure varies substantially ranging from 1 percent of FSU immigrants up to 40 percent.

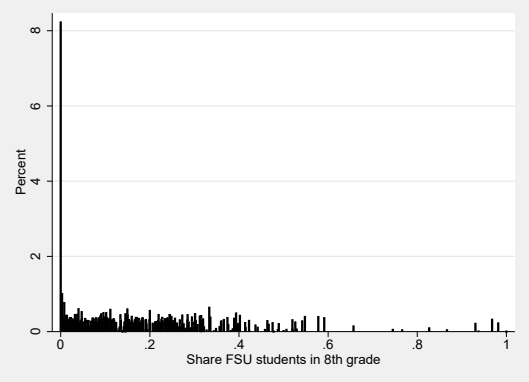
As discussed in Section 3, while there is no school choice in eighth grade, school allocation is a result of families' residential choices. Therefore, as residential choices are far from random, a causal interpretation of the relationship between FSU concentration and gender gaps in choices among natives requires ruling out confounding factors that drive both residential selection and gender gaps in educational outcomes. Table 6 presents correlations between the concentration of FSU immigrants in a school's eighth grade level and observable school and municipality of residence characteristics. We choose characteristics that have been established as determinants of

[27] This may also affect immigrants from other countries. However, given the small sample size and heterogeneity of this group in our context, we cannot reliably analyze this interaction.

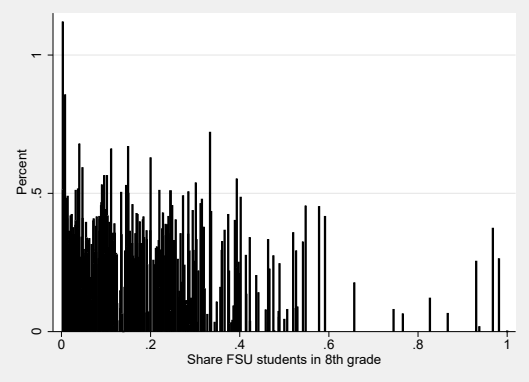
[28] We do not have the mother's country of birth.

Figure 4: Distribution of students by the share of FSU immigrant in their school's eighth grade cohort

(a) All schools



(b) Schools with a positive share of FSU



Notes: Distributions are presented for native born eighth grade students whose father was not born in FSU and who attend Hebrew language schools.

immigrants' residential choices (Card, 2009; Damm, 2009). The most commonly cited determinant of immigrant concentration is preexisting enclaves of immigrants from the same origin country. Column (1) shows that indeed the share of FSU immigrants in middle schools in 2002-3 is highly correlated with the share of their compatriots in municipalities of residence as measured by the 1983 Census, prior to the post-Soviet immigration wave. This aligns with the abundant evidence on the tendency for new immigrants to follow suit and move to the same cities as compatriots. Column (2) shows that they are also strongly correlated to early settlement patterns of the 1990 wave as reflected by the strong correlation with the share of FSU immigrants in the municipality, as measured by the 1995 Census.

With respect to local labor markets, the estimates in Table 6 reveal a negative relationship between the concentration of FSU immigrants in eighth grade level and female labor force participation in students' municipality of residence—as an indicator for local gender norms (column (3)), and no relationship with the percentage of employees in Hi-Tech occupations in the sub-district of residence.[29] FSU immigrants tend to locate in poorer neighborhoods, as reflected

[29]Municipality level female labor force participation is obtained from the 1995 population census and the share of high-tech employees is taken from Central Bureau of Statistics (2017), which reports employment share at the district and sub-district levels only.

by the fact that their share in a school is negatively correlated with the average education and income level of native families, as illustrated by columns (5) and (6) of Table 6[30]. This is likely driven by housing prices, as the size of the housing rental grants and available mortgages offered by the Israeli "direct absorption" policy in the 1990's largely constrained new immigrant to settle in low-rent-low-SES areas (Alterman, 1995; Gould *et al.*, 2009). Overall, results from Table 6 suggest that municipalities where the latest wave of FSU immigrants settled do not offer characteristics that are generally favorable to STEM orientation or gender equality. To be explicit, our identifying assumption is that conditional on observable characteristics discussed above, residential choices that determine FSU concentration are quasi-random with respect to the gender norms of native families.

Table 6: Correlation between municipality and school characteristics

	Municipality of residence				School average (z-scores)	
	% FSU 1983	% FSU 1995	Female employment	% in Hi-Tech	Family income	Parental education
Share FSU in 8th grade	1.595***	0.979***	-0.436***	-0.001	-0.046***	-0.058***
	(0.172)	(0.064)	(0.091)	(0.003)	(0.006)	(0.006)
Constant	0.043***	-0.037***	0.349***	0.129***	0.122***	0.129***
	(0.011)	(0.012)	(0.047)	(0.025)	(0.007)	(0.006)
Observations	596	598	584	597	515	514
R-squared	0.126	0.281	0.038	0.000	0.108	0.164

Notes: Observations are schools. Municipality level share of FSU immigrants and female employment rate are taken from 1995 and 1983 Census data, respectively. School level measures of parental education and family income were calculated from study's data set for school comprising at least 30 students at the eighth grade level. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 7 provides evidence of convergence of natives' behavior towards Soviet gender norms. The gender gap among natives in the propensity to study in a tertiary STEM program decreases as the proportion of FSU immigrants in their eighth grade school increases, even when accounting for school and municipality characteristics.[31] Note that, as expected, a higher proportion of immigrants

[30] for each students we calculate the average SES measures of native peers, excluding self.

[31] Including municipality characteristics reduces the sample size because there are several municipalities that were established after the 1995 Census and therefore do not have the relevant variables from the census. In Appendix Table A5 we replace the municipality characteristics by municipality FE and results are largely the same.]

comes with lower SES of students, hence a lower general propensity of natives to choose STEM (column 1), and this negative relationship disappears when controlling for school and municipality characteristics (column 2).

The gender gap in the propensity to choose Economics and business as well as Pink collar study fields decreases with the exposure to FSU immigrants. These patterns hold even when controlling for school and municipality characteristics. It is worth noting that, as expected, the propensity of native students to choose STEM and Economics is positively related to earlier concentration of FSU immigrants, but this does not account for the narrowing of the gender gap. Finally, our measure of district level high-tech employment seems to capture relevant characteristics of local labor market as it is positively associated with the choices of STEM and Economics and business study fields, but not with Pink collar and Social science.

6 Conclusion

The sudden and massive Jewish immigration from the Former Soviet Union (FSU) to Israel in the early 1990's creates the opportunity to illustrate the vertical persistence and horizontal diffusion of cultural norms, in particular gender identity. Here, we document the durable gender equal culture inherited from Soviet times. Gender gaps in educational choices are smaller among students of FSU origin, where women are particularly attracted to STEM and business occupations, and avoid the appeal of female-dominated teaching and social work sectors. We interpret these features as a legacy of the socialist episode, whose specific culture did not only drive women into science, but reduced the gender gaps in educational and occupational choices. Additionally, we document the association between the concentration of FSU students in a school and the tertiary education choices of Native young women who attended the same school in eighth grade. We show evidence that the orientation of native young women converges towards the patterns that are typical of FSU females, which narrows the gender gap among Natives.

What are the necessary conditions for the persistence of Soviet gender norms? In socialist countries, institutions were designed in order to make full-time female employment compatible with maternity which included extnsive child care services. This stands in stark contrast with standard Israeli public and private kindergarten, which operate between 7:30 and 13:30/16:30, severly limiting mothers' working time. It turns out that over time FSU immigrants have developed a network of private kindergarten (the Association of Immigrant Teachers - IGUM) that welcome children from 2 to 5 years old, from 7 am until 7 pm. The majority of children who attend these kindergartens are born in Israel to at least one parent from the former Soviet Union, and Hebrew and Russian are jointly the official languages.[32] This is revealing of the general attitudes of FSU families concerning the respective place of paid-work and motherhood in their time and investment. In a way, FSU women have managed to reproduce some (private) institutions that allow them to reach the same work-family balance as they (or their mothers) had in Soviet times. This is a powerful illustration of the persistence of culture, but also of the reciprocal influence of culture on institutions.

[32]Haaretz, December 27, 2018.

Table 7: Estimation of gender gaps among native with respect to eighth grade FSU concentration

	STEM		Economics and Business		Pink collar		Social science	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	-0.103***	-0.106***	0.010***	0.006*	0.105***	0.099***	0.091***	0.091***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female X share FSU	0.018***	0.011**	0.015***	0.015***	-0.023***	-0.019***	-0.005	-0.006
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
School								
Share FSU	-0.026***	0.001	-0.007***	-0.009***	-0.023***	0.016***	-0.010***	-0.002
	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Share Other immigrants		-0.005***		-0.002		-0.008***		0.005***
		(0.002)		(0.002)		(0.002)		(0.002)
Average family income		0.007**		0.006**		-0.001		0.008***
		(0.003)		(0.003)		(0.003)		(0.003)
Average parental schooling		-0.003		-0.004		0.021***		-0.004
		(0.004)		(0.003)		(0.003)		(0.003)
Municipality								
Share FSU in 1983		0.002		0.005**		-0.003		-0.002
		(0.002)		(0.002)		(0.002)		(0.002)
Female LFP		-0.052		-0.025		-0.045		0.062**
		(0.034)		(0.030)		(0.029)		(0.029)
Average schooling		0.015**		0.004		-0.007		0.018***
		(0.007)		(0.006)		(0.006)		(0.006)
Share employed in high-tech		0.002***		0.002***		-0.001		-0.002**
		(0.001)		(0.001)		(0.001)		(0.001)
Controls								
Individual SES								
Constant	0.197***	0.171***	0.102***	0.108***	0.031***	0.041***	0.048***	0.015
	(0.003)	(0.016)	(0.003)	(0.014)	(0.002)	(0.014)	(0.002)	(0.014)
Observations	44,194	38,645	44,194	38,645	44,194	38,645	44,194	38,645

Sample comprises native students whose father was not born in the FSU, and in specifications with municipality characteristics limited to students living in municipalities established before the 1995 Census. Binary dependent variables vary by column and indicate the chosen category of tertiary education against all other options, including "No tertiary studies". Programs included in each category are detailed in Table A2. Coefficients are obtained from a LPM with cohort fixed-effects. Individual SES indicators include categorical variables for parents maximal years of education and family income quintiles. Omitted categories are parents with 12 years of schooling and third quintile of family income. Middle school characteristics include "leave-one-out" measures of average parental education and family income for others in students' eighth grade cohort in school as well as an indicator if a school is a state-religious school. Municipality characteristics refer to municipality of residence in twelfth grade and are standardized. Share of FSU is taken from the 1983 Census; female labor force participation from the 1995 Census; share of high-tech employees is taken from Central Bureau of Statistics (2017), at the district and sub-district levels only. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

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Appendix tables

Table A1: Immigrants by country of origin, full population

	N N	% of immigrants	% of population
FSU immigrants			
Former Soviet Union Countries	8,653	76.89	14.13
European Former Communist countries	112	1.00	0.18
Other immigrants			
United States and Canada	921	8.18	1.50
European countries	462	4.11	0.75
Ethiopia	455	4.04	0.74
Latin America Countries	379	3.37	0.62
MENA countries	135	1.20	0.22
Other African countries	84	0.75	0.14
Oceania	27	0.24	0.04
Asia	26	0.23	0.04
Total immigrants	11,254		0.18
Native Israeli	49,984		0.82
Total	61,238		

Countries with less than 20 immigrants are reported as part of broader categories due to data restrictions on individual level data.

Table A2: Tertiary study fields categories

Category	General study field (CBS categorization)	Specific study fields
STEM	Mathematics, statistics & computer science	
STEM	Physical sciences	
STEM	Biological sciences	
STEM	Agricultural sciences	
STEM	Engineering and architecture	
Social sciences	Social sciences	Behavioral sciences
Social sciences	Social sciences	Communication
Social sciences	Social sciences	Criminology
Social sciences	Social sciences	BA Social sciences
Social sciences	Social sciences	Sustainability
Social sciences	Social sciences	Geography
Social sciences	Social sciences	Cognitive Science
Social sciences	Social sciences	Psychology
Social sciences	Social sciences	International Relations
Social sciences	Social sciences	Political Science
Social sciences	Social sciences	Women's and Gender Studies
Social sciences	Social sciences	Sociology and Anthropology
Social sciences	Social sciences	PPE
Pink collar	Education and teacher training	
Pink collar	Social sciences	Social Work
Pink collar	Social sciences	Human Services
Pink collar	Health care professions	Dietetics
Pink collar	Health care professions	Physiotherapy
Pink collar	Health care professions	Occupational Therapy
Pink collar	Health care professions	Emergency Medical Services
Pink collar	Health care professions	Nursing
Pink collar	Health care professions	Public Health
Pink collar	Health care professions	Speech-language Therapy
Pink collar	Library science	
Economics, business and management		Environmental Economics
Economics, business and management		Economics
Economics, business and management	Business and Management	
Other	Humanities	
Other	Language, literature and regional studies	
Other	Art & design	
Other	Law	
Other	Medicine	
Other	Health care professions	Optometry
Other	Health care professions	Pharmacy

Note: Some General study fields categories do not have specific sub–fields. The Central Bureau for Statistics categorizes all specific study fields in all higher education institutions in Israel, 175 in total, into 15 general study fields.

Table A3: Tertiary attainment and other study fields, by origin

	Other study fields			Studied in tertiary education		
	(1)	(2)	(3)	(1)	(2)	(3)
Female	0.044***	0.046***	0.045***	0.120***	0.130***	0.124***
	(0.005)	(0.006)	(0.006)	(0.011)	(0.010)	(0.009)
Native	0.035***	0.020***	0.023***	0.107***	0.035***	0.067***
	(0.004)	(0.004)	(0.004)	(0.008)	(0.013)	(0.010)
Other immigrant	0.032***	0.013	0.018*	0.061***	-0.002	0.038**
	(0.008)	(0.010)	(0.010)	(0.016)	(0.017)	(0.015)
FemaleXNative	-0.000	0.001	-0.000	0.025**	0.023*	0.014
	(0.006)	(0.007)	(0.007)	(0.011)	(0.012)	(0.011)
FemaleXOther	-0.001	0.006	0.006	-0.001	0.003	0.002
	(0.013)	(0.016)	(0.016)	(0.023)	(0.022)	(0.020)
Controls						
Individual SES		X	X		X	X
Middle school char.		X	X		X	X
Mathematic achievement and comp adv			X			X
Constant	0.044***	0.033***	0.036***	0.372***	0.317***	0.340***
	(0.003)	(0.005)	(0.005)	(0.008)	(0.012)	(0.012)
Observations	61,238	59,847	59,847	61,238	59,847	59,847
R-squared	0.007	0.022	0.026	0.027	0.138	0.245
Municipality FE		998	998		998	998
NA and EU immigrant	0.045***	0.013	0.014	0.164***	0.019	0.032
	(0.016)	(0.022)	(0.022)	(0.028)	(0.029)	(0.029)
FemaleXNA and EU	-0.027	-0.025	-0.023	-0.041	-0.038	-0.017
	(0.023)	(0.032)	(0.033)	(0.039)	(0.035)	(0.039)

Omitted categories are male and FSU immigrants. Coefficients are obtained from a LPM with cohort fixed-effects. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table A4: Main regression estimates, sample of student who immigrated before age 7

	STEM	Economics and business	Pink collar	Social science	Mathematics 8^{th}	Mathematics 12^{th}	Literacy 8^{th}	Literacy 12^{th}
Female	-0.106***	0.033***	0.068***	0.079***	0.017	0.107***	0.418***	0.249***
	(0.013)	(0.009)	(0.006)	(0.008)	(0.029)	(0.021)	(0.026)	(0.021)
Native	-0.012	0.021***	0.003	0.013***	-0.217***	0.036**	0.010	0.127***
	(0.010)	(0.007)	(0.004)	(0.004)	(0.040)	(0.018)	(0.026)	(0.017)
Female X Native	-0.009	-0.026***	0.040***	0.014*	0.053*	0.013	-0.020	-0.023
	(0.014)	(0.008)	(0.009)	(0.008)	(0.032)	(0.022)	(0.027)	(0.021)
Constant	0.200***	0.092***	0.003	0.027***	-0.029	0.007	-0.285***	-0.134***
	(0.014)	(0.009)	(0.007)	(0.006)	(0.046)	(0.021)	(0.033)	(0.020)
Observations	55,042	55,042	55,042	55,042	48,533	55,045	50,889	55,045
R-squared	0.127	0.014	0.059	0.032	0.133	0.288	0.168	0.247
	996	996	996	996		874		874

Sample includes only Native students and FSU immigrants for whom year of immigration is reported. Other immigrants are dropped because the variable "year immigrated" is missing for 40.3% of Other immigrants, compared to only 3.1% of FSU immigrant.

Omitted categories are male and FSU immigrants. Dependent variables vary by panel. Coefficients are obtained from a LPM with cohort fixed-effects. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table A5: Gender gaps among natives with respect to eighth grade FSU concentration

	STEM	Economics and Business	Pink collar	Social science
Female	-0.116***	0.005	0.106***	0.093***
	(0.004)	(0.004)	(0.005)	(0.004)
Female X share FSU	0.011**	0.012***	-0.022***	-0.006
	(0.005)	(0.004)	(0.004)	(0.004)
School				
Share FSU	-0.004	-0.007*	0.013***	0.003
	(0.005)	(0.004)	(0.004)	(0.003)
Share Other immigrants	-0.005*	-0.003	-0.007*	0.004*
	(0.003)	(0.003)	(0.004)	(0.002)
Average family income	0.007*	0.006	-0.005	0.012***
	(0.004)	(0.004)	(0.006)	(0.003)
Average parental schooling	-0.003	-0.001	0.023***	-0.007*
	(0.005)	(0.004)	(0.007)	(0.004)
Controls				
Individual SES	X	X	X	X
Prior achievement	X	X	X	X
Constant	0.187***	0.118***	0.004	0.045***
	(0.008)	(0.006)	(0.006)	(0.004)
Observations	41,785	41,785	41,785	41,785
Municipality FE	929	929	929	929

Sample comprises native students whose father was not born in the FSU. Binary dependent variables vary by column and indicate the chosen category of tertiary education against all other options, including "No tertiary studies". Programs included in each category are detailed in Table A2. Coefficients are obtained from a LPM with cohort fixed-effects. Individual SES indicators include categorical variables for parents maximal years of education and family income quintiles. Omitted categories are parents with 12 years of schooling and third quintile of family income. Middle school characteristics include "leave-one-out" z-scores of average parental education and family income for others in students' eighth grade cohort in school, as well as an indicator if a school is a state-religious school. Mathematics is a z-score of eighth grade GEM score and Mathematics/Hebrew is the ratio of eighth grade mathematics and literacy z-scores, windzorized at the 1^{st} and 99^{th} percentiles. Municipality fixed effect are for municipality of residence in twelfth grade. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$